VOLUME V

Runoff Treatment BMPs (Minimum Requirements #5, #6, #8, #10)





Runoff Treatment BMPs

- **Purpose**

  Reduce Pollutants Using Physical, Biological & Chemical Removal Mechanisms so that beneficial uses are maintained and, where applicable, restored.





Volume V
Runoff Treatment BMPs

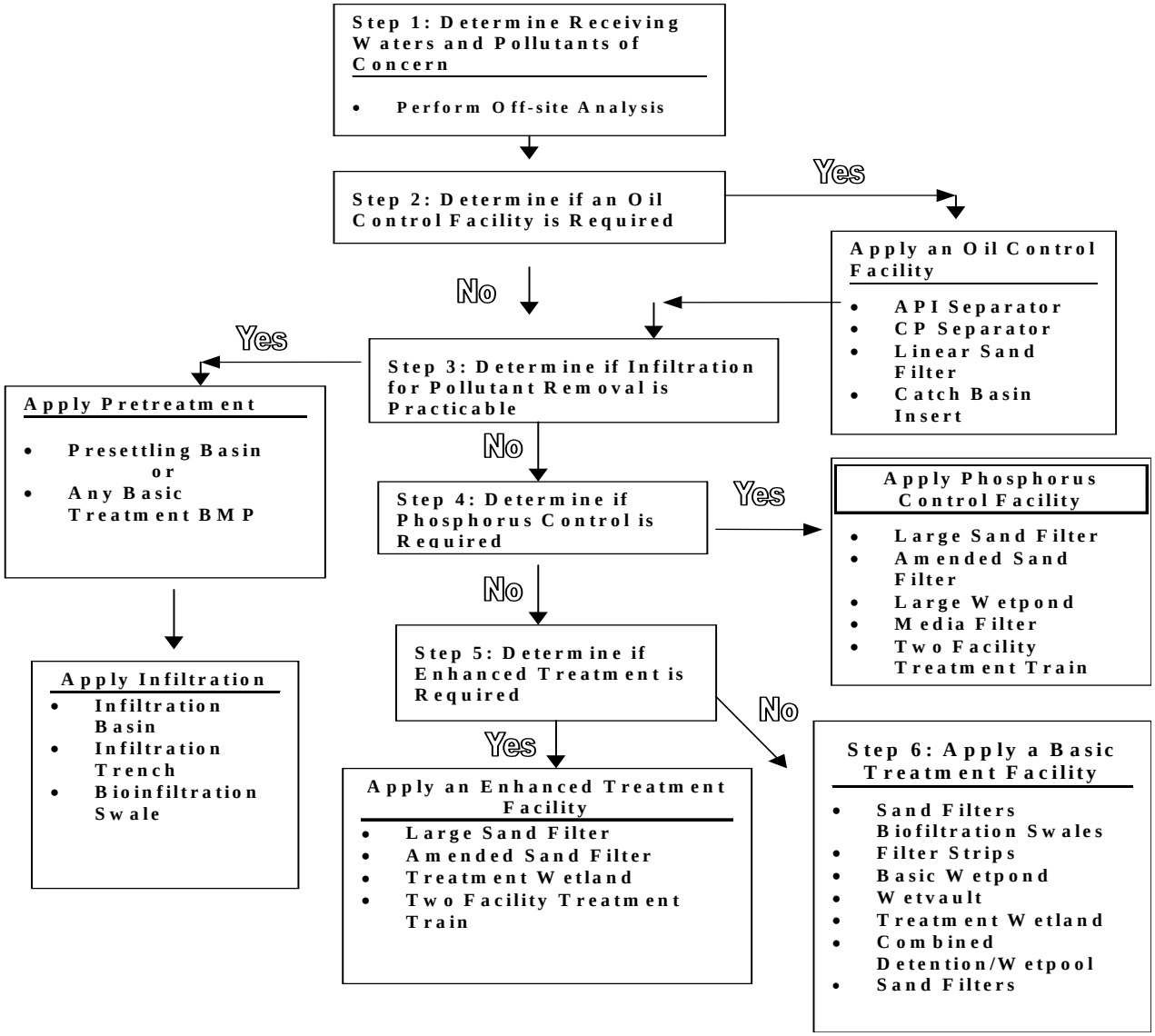
- Chapter 1 - Introduction
- Chapter 2 - Treatment Facility Selection Process
- Chapter 3 – Treatment Facility Menus
- Chapter 4 – General Requirements
- Chapter 5 – On-site Stormwater Management

Chapter 2
Treatment Facility Selection

- Step 1 – Receiving Waters & Pollutants
- Step 2 – Oil Control Necessary?
- Step 3 – Infiltration Treatment Possible?
- Step 4 – Phosphorus Control Necessary?
- Step 5 – Enhanced Treatment Necessary?
- Step 6 – Basic Treatment Backstop

Treatment Facility Selection

Figure 1.1 Treatment Facility Selection Flow Chart







Chapter 3 - Treatment Facility Menus

- Oil Control
- Phosphorus
- Enhanced
- Basic





Oil Control

- Applies to High-Use Sites
  - ≥ 100 vehicles/1000 s.f. building area
  - petroleum storage/transfer > 1,500 gallons/yr
  - storage/maintenance of ≥ 25 vehicles over 10 tons
  - Intersections with 25,000 ADT/15,000 ADT
- Not Stand Alone BMPs
  - upstream of other BMPs





Oil Control (cont.)

- **Performance Goal: (Not Effluent Limits!)**
  - **No ongoing, recurring visible sheen**
  - **TPH ≤ 10 mg/l daily average; ≤ 15 mg/l peak**
- **4 BMP Options:**





Phosphorus Treatment

- Phosphorus sensitive watersheds
  - local designation or acceptance in a Water Clean-up Plan (TMDL)
- Performance Goal: 50% total P
  - WQ Design Volume/Flow Rate
- Options - 5 BMPs; 7 BMP trains





Enhanced Treatment

- Industrial, Commercial, Multi-family, Arterials and Highways to: fish-bearing streams, lakes, or their tributaries
- Performance Goal: Greater dissolved metals removal
  - Reduce WQ standards violations
- BMP Options - 4 BMPs; 7 BMP trains





Basic Treatment

- Discharges to ground, unless soil suitability criteria met
- Residential projects not in Phosphorus area
- Projects to Appendix V-A waters
  - Use Appendix I-C
- Projects not to fish-bearing waters
- Landscaped areas & employee only parking of industrial/commercial sites





Basic Treatment

- **Performance Goal:**
  - **80% TSS removal, or**
  - **20 mg/l TSS if influent < 100 mg/l**
  - **Typical particle size distribution**
  - **Goal applies to WQ design volume/flow rate**
  - **Goal applies on Annual Average including bypass**
- **BMP Options - 8 listed**

Chapter 4
General Requirements

- Design Volume & Flow
- Sequencing
- Setbacks, Slopes & Embankments
- Facility Liners
- Hydraulic Structures
- Maintenance Standards





Water Quality Design Flow Rate - Section 4.1.2

- Requirement = Treat 91% of Annual Average Volume based on historical record
- WWHM will identify flow rate
  - Downstream: Full 2-year release rate
  - Interim Upstream: Table 4.1
    - Use Post-developed w/o Detention Facility
    - % of the 2-year frequency flow
    - Varies with % Effective Impervious Area

Impact of New Flow Rate on Design Criteria

Treatment type	Draft Criteria	New Criteria
Basic Bio-Swale	9 minutes	22 minutes
Continuous inflow swale	N/A	44 minutes
Filter Strips	9 minutes	22 minutes
O/W Separators	Q = 1992 flow rate	Q = 2.15 X new flow rate





Chapter 5 - On-site Stormwater Management

- Dispersion and Soil Quality BMPs (Required for Equivalency)
  - Downspout Dispersion
  - Concentrated Flow Dispersion
  - Sheet Flow Dispersion
  - Post-Construction Soil Quality and Depth
- Downspout Infiltration (Vol. III, Chapter 2)
  - (for Non-Pollution Generating Surfaces)

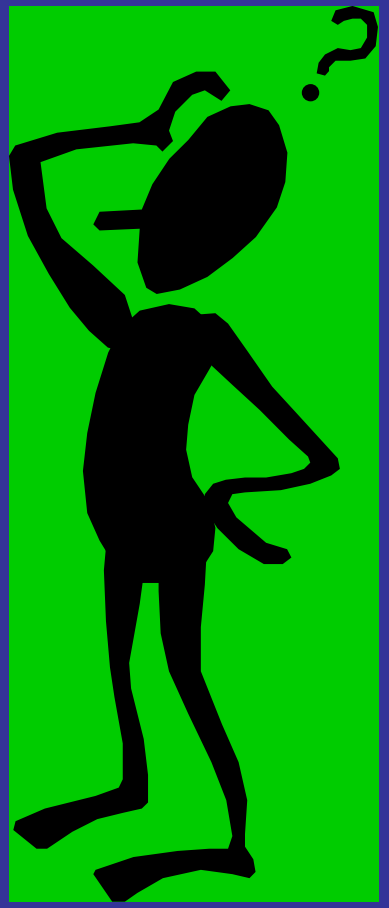




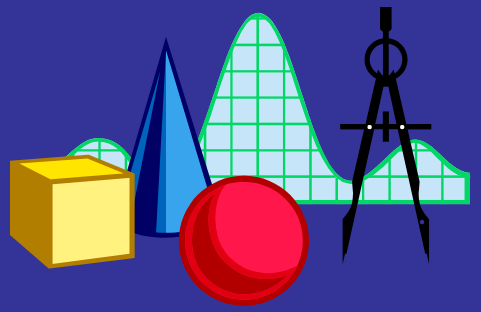
Chapter 5 - On-site Stormwater Management

- Site Design BMPs (Recommended)
  - Preserving Natural Vegetation
  - Better Site Design
- Other Practices (Recommended)
  - Full Dispersion
  - 6 others
- Permeable/Porous Pavements (Recommended)
  - T5.40 does not get flow credit in WWHM

General Questions



VOLUME V
RUNOFF TREATMENT
BMPs







Chapter 6 Pretreatment

- 6.2. Systems to consider
  - Presettling Basins,
  - basic treatment BMPs,
  - emerging technologies,
  - detention ponds
- BMP T6.10 Presettling Basin

  New design based on wetpool of 30% of runoff from 6 month, 24hr. event





Chapter 7- Infiltration and Bio-infiltration Treatment Facilities

- BMP T 7.10 Infiltration Basins
  BMP T 7.20 Infiltration Trenches
  BMP T7.30 Bio-infiltration Swales
- 7.3.1 Site Characterization Criteria
  - Surface Features
  - Subsurface Characterization
  - Infiltration Rate Determination
  - Soil Testing
  - Infiltration Receptor





Chapter 7 - Infiltration (cont.)

- 7.3.2 Design Infiltration Rate Determination
  - Table 7.1 USDA Soil Texture
  - Table 7.2 Gradation Testing
  - Table 7.3 In-situ PIT preferred vs. double-ring
- Deleted Darcy's Law
- 7.3.4 Sizing Criteria based on Volume using WWHM





Chapter 7 - Infiltration (cont.)

- **7.3.3 Site Suitability Criteria**
  - **SSC-2 GW Protection Area**
  - **SSC-3 Vehicle Traffic Areas**
  - **SSC-6 Soil Physical/Chemical Suitability**
  - **SSC-9 Verification Testing of Completed Facility**





Chapter 8
Sand Filtration

- 8.6 Design Criteria
  - Basic Sand Filter to treat 91% runoff volume
  - Large Sand Filter to treat 95% runoff volume
  - Use of WWHM
  - Example Calculation based on SCS Curve Number, Routing Factor, Darcy's Law
  - On-Line/Off-line





Chapter 8 - Sand Filtration (cont.)

- Table 8.1 Sand specification
- BMP T8.00 Sand Filter Basin
- BMP T8.10 Sand Filter Vault
- BMP T8.20 Linear Sand Filter
- Appendix V-C Geotextile Specifications

Chapter 9
Biofiltration

- BMP T9.10 Basic Biofiltration Swale
- BMP T9.20 Wet Biofiltration swale
- BMP T9.30 Continuous inflow swale
- BMP T9.40 Basic Filter Strip
- BMP T9.50 Narrow Area Filter Strip





Biofiltration (cont.)

- Table 9.1 Sizing Criteria/Basis
  - 1992 Metro Study
  - Dr. Richard Horner Recommendations
  - Colwell Study (2000)
  - Manning's n
  - Maximum hydraulic velocity
- Sizing Procedure (pages 9-3 to 9-16)





Chapter 10
Wetpool Facilities

- BMP T 10.10 Wetponds
  - Basic-wetpool volume: the 6 mo., 24hr. storm event
  - Large-wetpool volume: 1.5 times the 6 mo., 24hr. storm event
  - Use SCS Curve # equation (Vol. III, Section 2.3.2)
  - Table 10.1-Plant species recommended for wetponds
- BMP T10.20 Wetvaults
- BMP T10.30 Stormwater Treatment Wetlands
- BMP T10.40 Combined Detention/Wetpool Facilities





Chapter 11
Oil/Water Separator

- **BMP T11.10 API (Baffle Type)**

  Added design flexibility for small sizing

  BMP T11.11 Coalescing Plate Type
- **11.4 Applications**
- **11.5 Site Suitability**
  - **TSS control**
  - **Peak flow bypass**
  - **Maintenance**





Chapter 12
Emerging Technologies

- 12.2 Ecology Role (evaluation process)
  - Test Protocol
  - Technical Review Committee
  - Assessing Levels of Development (Pilot & General Use Levels)
  - Ecology Web Site
- For New/Re-development: must test performance
- For retrofits-performance testing recommended





Chapter 12 (cont.)

- 12.6 Examples of Emerging Technologies
  - Media Filters
  - Amended Sand Filters
  - Catch basin Inserts
  - Manufactured Storm Drain Structures
    - Vortex Enhanced Sedimentation
    - Cylindrical Screening
    - Engineered Cylindrical Sedimentation
  - High Efficiency Street Sweepers

General Questions